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Numerical study of thin-walled sampler performance for aerosols in low windspeed environments

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Abstract

The aerosol aspiration into a thin-walled sampler horizontally oriented in low windspeed environment is numerically investigated. The air flow is assumed to be incompressible and either potential or viscous. Depending on the model the velocity field is computed either by the boundary element or by the finite volume method. The aspiration efficiency A is calculated in the region of a very small ratio Ra of wind to sampling velocities when the gravity influence becomes noticeable. The numerical results are compared with the known experimental data and approximate formulas. It is shown that a combination of approximate formulas for aspiration efficiencies in calm and moving air proposed by Su and Vincent (2004b) and Medvedev (2002) gives a fair approximation of the numerical results in the range of small Ra.

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